

**Energy Systems Catapult Response to the Ofgem Consultation:**

***Getting more out of our electricity networks by reforming access and forward-looking charging arrangements***

**Introduction**

This response is submitted on behalf of the Energy Systems Catapult (ESC). The ESC supports innovators in creating opportunities from the transition to a clean, intelligent energy system. We are part of a network of world-leading centres set up by the government to transform the UK’s capability for innovation in specific sectors and to help drive future economic growth.

The Energy Systems Catapult has built a set of inter-disciplinary insights and capabilities on the UK’s low carbon heating challenges, based on its work in:

* Smart systems and heat
* Whole energy system analysis
* Consumer insight & Home heat trials
* Market architecture analysis

By taking an independent, whole energy systems view, we work with stakeholders across the energy sector (consumers, industry, academia and government) to identify innovation priorities, gaps in the market and overcome barriers to accelerating the decarbonisation of the energy system at least cost. In doing so, we seek to open up routes to market for innovators, as well as supporting them to understand how their products, services and value propositions fit into the transforming energy system.

The ESC is working with the UK government and local authorities to deliver the *Smart Systems and Heat (SSH) Programme***,** determining the most effective means of decarbonising the UK’s 27 million homes and contributing to the target of an 80% reduction in the UK’s Greenhouse Gas emissions by 2050. We are also closely involved with the Future Power Systems Architecture (FPSA) project.

If you wish to discuss the contents of this submission, please contact Tony Dicicco at:

tony.dicicco@es.catapult.org.uk

# Overview / key points

***Charging principles***

1. The cost of energy in the longer term will be driven by innovation and investment in a balanced portfolio of new technologies and infrastructures. This in turn will depend on the creation of a credible, long-term policy framework which aligns the incentives of market players with societal objectives around service reliability and decarbonisation.
2. A whole-system, consumer-centric market which drives the trade of energy through evidence-based decisions will drive investment in future technology mix decisions. We believe this is more important than focusing on the challenges of single technology areas. A holistic GB Energy System (GBES) should have prices that are reflective of the real-world benefits and costs experienced by a given solution provider. It is important to remember that storage, including battery technologies, provides demand smoothing rather than producing energy. This is an obvious but important distinction and is critical when considering both domestic and commercial consumers.
3. The ESC supports the general principle that users of the energy networks should bear the costs that they impose on the system. Whilst some reduction in charges may be appropriate where there is a genuine and measurable reduction in network costs, it is not appropriate for the avoided costs to be borne by other network users. Therefore, we believe that a move away from mainly kWh-based network charging to a more capacity-based solution is required so that network fixed costs can be recovered equitably.
4. More cost reflective tariffs, rebalanced to higher standing charges, improve the overall efficiency of the energy sector, remove perverse incentives for wasteful consumer investments, and assist in promoting low carbon policies and innovative technologies.

***Managing constraints on the distribution networks***

1. The flexibility offered by Distributed Energy Resources (DER) such as energy storage can have a positive impact and can potentially reduce a network operator’s costs by offsetting the need to reinforce the network. However, there is an element of risk in relying on DER: both energy storage and Demand Side Response (DSR) in that the expected kWh of energy increase or demand reduction may not turn up. It seems appropriate that flexibility should be rewarded with lower connection and use of system charges where it reduces network and system balancing costs, but non-delivery penalties will need to apply. We believe that to deliver the full benefits of flexibility, price signals will need to develop to reflect the value to our energy system of smart technologies and processes.
2. Electric vehicle charging, unless carefully managed, has the potential to create significant power system problems, both in terms of the adequacy of aggregate generation capacity and more local network capacity problems. There are useful measures, with the potential to substantially mitigate these problems, that can be based on a combination of cost reflective tariffs and changes in the way that electricity service is offered to consumers. Options include “supplier managed” load, in which, for example, a consumer, in exchange for a favourable kWh rate, would place an “order” for overnight (or some chosen period) delivery of kWh charge.
3. Distribution charges are currently acting as a barrier to the development of a more flexible system. Customers generating their own power do not pay their fair share of the costs of using the system. As the largely fixed DNO charges are recovered on a per unit basis, a customer generating its own power pays significantly less than a customer buying from the grid, but there is no immediate, corresponding benefit to the DNO. To address this, Distribution Use of System (DUoS) charges could be recovered more on a capacity basis than on a usage (kWh) basis, though a hybrid of both would avoid “free-riding” and still provide signals to use the network at appropriate times.
4. It is appropriate for generators that are reducing network capacity headroom due to the level of exported power flows, whether or not they are netting off local demand, to incur positive, rather than negative DUoS charges. However, distributed generators, as with energy storage, can improve network capacity and security or reduce network capacity headroom for other network users. Technology can enable distributed generation to connect more cheaply and more quickly in exchange for flexible connections that allow for curtailment of generation output if necessary. Generation can also provide ancillary services to defer the need for network reinforcement and is rewarded through lower connection costs or payments for ancillary services (availability and utilisation payments). However, an alternative approach could be for DUoS charges (or payments) to be structured to reflect the conferred benefits of flexibility or network support services.

## *Effective coordination and integration of energy networks*

1. It is important to adopt a whole system perspective when developing policy and regulatory measures for both generation and demand, connected at different voltages. For instance, the optimisation of power system storage requires multiple effects to be taken into account across the supply chain, both technically and commercially. Electrical storage connected at the transmission level may not help to defer investment in the reinforcement of a distribution network and therefore a whole system approach is required. One factor that will limit the deployment of storage is the need to achieve a significant number of charge/discharge cycles per annum. If this does not happen, then the fixed costs must be recovered over a small volume of energy delivered, making it financially unattractive.
2. Energy vectors will become increasingly interconnected, such as through gas boilers hybridised with electric heat pumps, petrol engines hybridised with batteries for vehicle motive power, multiple energy conversion assets in heat network energy centres, etc. There will need to be coordination between energy vectors in order to better manage the operation of the electricity and gas (and heat) networks and to optimise network access and infrastructure development. Without this coordination, the demand for electricity will become both larger and more volatile.
3. The ESC believes that local area energy planning can play an important role in guiding decisions about cost effective investments on low carbon local energy systems (including local energy network infrastructures). The evidence and lessons learnt from the Smart Systems and Heat programme managed by the ESC will be valuable in considering how to reduce the cost of energy networks in the longer term. One key issue will be to consider options for governance of collective decisions about energy network investments (e.g. the socially optimal combination of heat networks, electrification and other low carbon options to decarbonise heat in different local areas).

## *Taking forward the review*

1. It is right to review access and charging arrangements to deal with the growth in low-carbon technologies e.g. EVs and Heat Pumps. There is a need to consider the interface between Transmission and Distribution, ensure a level playing field for users (whether connected at T- or D-level) and determine how to encourage more “off-peak” access. A comprehensive (total) review of the access and charging arrangements would seem best. The ESC would like to be part of the review process.
2. The proposed review should consider the outputs from the ENA’s *“Open Networks-Future Worlds”* project which is looking at how the electricity transmission and distribution networks could be structured and operated. The access and charging reforms being considered by Ofgem could help the market to determine the best use of network capacity and reduce the need for the ESO and DNOs to procure flexibility, or reinforce, to manage network constraints directly. We welcome Ofgem’s statement that it will continue to work closely with the ENA Open Networks project but are not sure how these two work areas will be coordinated. We would appreciate some clarity on this. It would seem appropriate that Ofgem leads the review, working closely with industry to develop enduring access and charging solutions.
3. Many of the challenges facing future networks are being considered through the Future Power Systems Architecture (FPSA) project, being managed jointly by the ESC and Institution of Engineering and Technology (IET). We believe Ofgem should consider the findings of FPSA, in particular the emphasis on the importance of flexible and agile governance and change management mechanisms to keep pace with emerging trends in the market and new technologies.
4. The ESC does not see a strong case to abandon the current framework of network price controls given their strong monopoly characteristics. Future reforms should focus on increasing the agility of network governance processes to enable innovation and increasing the spatial and temporal accuracy of pricing of network capacity and constraints to incentivise flexibility and efficient location and operation of generation.
5. ***A key element of the review should be an evaluation of BSUoS charging***: BSUoS charges can be volatile and difficult to forecast – this can expose parties, especially smaller suppliers and generators, to significant risk. We believe that any review should cover how BSUoS charges can be made more cost reflective and transparent, how BSUoS costs can best be recovered and who should pay them. More accurate BSUoS forecasts from the ESO will be key to enabling demand-offtakers and generators to better manage their costs. As the ESO is the key player in procuring balancing services and operating the Balancing Mechanism, it would seem appropriate that the ESO should lead any review of BSUoS charging. We agree that a taskforce should be convened with members from all sectors of the electricity industry including disruptive technologies and customer groups as well as the ‘established’ players.
6. ***We support the proposed timescales for the review*** as outlined in Figure 1 (p.57 of the consultation), we believe that an SCR should be launched as soon as possible with the aim to introduce network charges based on new access and charging principles by April 2022. This timetable would allow interaction with the RIIO-ED2 process. We would support ‘*Option 3’* where Ofgem would lead an end-to-end process to develop code modifications. This would create opportunities for participation from parties who are not code signatories and would avoid existing parties having undue influence on the outcomes (this is a criticism of the existing code modification processes).
7. ***In terms of the review of access rights for large users***, we support the review having a narrower scope and being led by industry (‘*Option A’*) outside the SCR process ,as this should mean that any changes could be implemented sooner.